

# STANDARD OPERATING PROCEDURES

## 2003 GOLDEN EAGLE SURVEY

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## Introduction

The following document contains guidance on methods for the 2003 line transect aerial surveys for golden eagles (*Aquila chrysaetos*) in the Western United States. For discussions of sampling design and data analysis refer to the project proposal prepared by WEST, Inc (solicitation # 982103R041).

## Flight Methodology

**Flight Crews.** Three crews of 2 observers and one pilot each are required to complete the surveys (total of 228 hours). Each crew will complete approximately 73 hours of transect flight and ferry time between transects. We have a 27-day window for completing surveys (August 18 – September 15), thus an average of 2.8 flight hours per day per crew is required to complete the surveys. Crew leaders will strive to complete a minimum of 3 transects per day. Averaging 3 transects per day, surveys can be completed in 19 days. Crew leaders are expected to complete more than 3 transects per day when possible to make up for lost days due to weather and logistics. Survey efforts will be distributed evenly between the three crews. It is extremely important that crews maintain daily contact with each other to report problems and let others know what transects have been flown. Daily communication with the Project Manager (Rhett) will ensure all transects are flown only once and in an efficient manner.

**Observers/Aircraft.** There will be two main observers in each aircraft. A third observer (Ryan) will rotate among the three survey crews and during these surveys “double-observer” methodology will be used to estimate detection functions based on distance from aircraft, habitat type, age of golden eagle, and observer. Crew leaders must keep in contact with Ryan to inform him of flight schedules so that he can transfer between flight crews as the surveys are conducted.

**Timing of Surveys.** We will begin the surveys August 18, 2003 and hopefully complete all surveys by September 8, 2003. Depending on weather conditions, surveys will be conducted throughout the day. During the early morning hours, all transects will be flown in an east to west orientation in order to provide the best possible light for detecting eagles. During the late morning and early afternoon, transects will be flown either direction. Transects conducted during the late afternoon will be flown in a west to east orientation. During the late summer, golden eagles may spend more time flying in the afternoon when the air temperature warms and thermals are available. Because detection probabilities of flying versus perched eagles may differ, most transects need to be flown in the mornings and early afternoons, when possible.

**Weather Restrictions.** Weather restrictions and the relative safety of flight will be determined in the field and will depend upon weather conditions on any given day. Safety of crew members and pilots are the first priority in assessing if surveys should be conducted during inclement weather (high winds, precipitation). Crew leaders will question the pilot to determine if standard survey protocol (below) may be followed and the plane safely flown. If the pilot and crew leader determines that surveys cannot be

conducted safely, surveys will be halted until weather conditions improve. Surveys will not be conducted during rain, snow, fog or other precipitation events that reduce observer visibility to less than one mile.

**Transect Flights.** Safety should be the primary concern during transect flights and to and from transect waypoints and airports. Two different methods will be used for conducting the aerial surveys, based on safety and flying conditions. Surveys within relatively flat and open terrain (safer flying conditions) will be conducted at an approximate air speed of 87 knots (100 mph) and the airplane will be maintained at an altitude of 107 m (350 ft) above the ground level (AGL). Surveys within relatively rugged terrain (steep topography, coniferous forest, steep canyons) that involve less safe flying conditions will be conducted at approximately 87 knots (100 mph) and the airplane will be maintained at an altitude of 150 m (500 ft) AGL (ground level reference should be highest point of ground level in immediate area).

**Off-Transect Flight.** The pilot will determine the most appropriate airspeed and altitude for flying between transect waypoints (end of one transect to the beginning of the next) and the airport. Since no visual searching or recording of golden eagles will be conducted when flying off transect lines, airspeed and altitude should increase when flying off-line in order to maximize the safety and efficiency of the surveys.

## Golden Eagle Sightings

**Golden Eagle Sighting and Age Classification.** The definition of a golden eagle sighting is as follows: A golden eagle sighting consists of an individual golden eagle or group of eagles sighted near each other while flying on the designated transect. Golden eagles sighted while flying off-line (e.g. to and from transect way-points and airports) will be recorded in the “general comments” section on the field data form, but the airplane will not change course or speed in order to verify the sighting, age the eagle or GPS its location. Data from sightings off-transect will be mentioned in the final report, but will not be included in the analysis.

Golden eagles observed are recorded in the following three categories:

- A. Juvenile
- B. Sub-Adult
- C. Adult

Golden Eagle aging criteria will be determined during an aging workshop taught by Bill Clark on August 14 and 15<sup>th</sup>, 2003.

Every effort should be made to correctly age golden eagles observed from the transect line however, on rare occasions when determining age is not possible, 2 other categories for recording the observation(s) are available:

- D. Unknown Immature

#### E. Unknown

**What to do When a Golden Eagle Has Been Sighted.** If a golden eagle has been sighted while flying on a designated transect line, pertinent information must be recorded in the field data form and the onboard GPS unit. Each crew will have one observer responsible for filling out the field data form and a second observer will be responsible for the GPS unit. If a golden eagle has been sighted on the ground or perched, the observer must communicate with the other observer(s) and pilot that an eagle has been spotted. The pilot will then pull off-transect to move in closer to the location where the bird was first sighted. This will allow the observers to verify that the bird is in fact a golden eagle, age the eagle, and GPS the approximate location of the observation. After all necessary information has been recorded on the field data form and in the GPS unit, the pilot will bring the aircraft back to the transect line at the point of departure from the transect line when the bird was observed. The observer with the GPS unit, can assist the pilot in returning to the transect line by monitoring the aircraft's location using the GPS. Any golden eagles spotted while off-transect and in route to age and GPS an eagle's location should be noted in the "general comments" section of the field data form, but does not count as an eagle observed while on transect.

**Reporting by Back-Left Observer.** For a golden eagle sighting on the left side of the aircraft by the back-left observer, this observer will notify the rest of the flight crew that an eagle or group of eagles has been sighted. The observer will state that a golden eagle has been sighted on the left of the transect line, the age of the eagle (if known), and characteristics of the eagle's location so that the pilot can navigate the aircraft closer to where the eagle was observed. For example, if during flight on a transect the back-left observer spots 1 adult and 1 sub-adult golden eagle perched on rock on the left side of the aircraft, the observer will announce "left side, 2 total eagles, 1 adult, 1 sub-adult, perched on rock." When the aircraft is approximately directly above the location where the eagles were originally sighted, the observer with the GPS unit will record the location at which the bird was first sighted in the GPS unit. Record where the bird(s) are perched (e.g., rock outcrop, power pole, ground, fence post) on the individual Description line for each perched observation. The individual Comments line for each observation is for additional bird-specific information, such as when one bird may have been seen initially, but two were actually present and recorded at the perch site. Wait to relay the latitude and longitude of the location to the observer filing out the field data form until you are between transects. The observers need to communicate with each other to verify the transect line being flown, the observation number (start with #1 on each transect), the observation's GPS location, and the habitat type the eagles were observed in. This communication is necessary to ensure that data from the field data form and the GPS unit can be linked for analysis.

If an entry has been started on the data sheet for either a perched or flying bird, but upon further inspection, it is not a golden eagle, do not delete the observation number, but line through the entries and add a comment (e.g., final ID turkey vulture).

**Reporting by the Front-Right and Back-Right Observers.** A double sampling approach will be used on the right side of the aircraft, on some of the transects. In this

approach, the front and back seat observers on the right side of the aircraft will not announce the golden eagle sightings when they are observed. Instead they wait an appropriate length of time (5 to 20 seconds) to ensure the observed eagle is out of view of the other observer. Once the observed eagle or group of eagles is passed and out of sight of the back seat observer, and no other eagles are in sight on that side, then the observer(s) will announce the sighting, and the pilot will pull off line in a fashion so that the group under question can be verified, aged, and the observed location recorded for perched birds. It is important that the observers, once off-line, pay most attention to the location of the eagles in question so that the pilot can efficiently circle and locate the eagles. A determination will be made based on which observer(s) on the right side observed the eagles or eagle group. Once an observer on the right side of the aircraft has announced that a golden eagle or group of eagles has been sighted, the observer with the field data form will begin filling out the field data form, making sure to indicate on the form which observer(s) on the right side of the aircraft saw the bird. This crucial piece of information is not meant to indicate which of the observers first called out the sighting, but whether only one or both of the observers on the right side actually saw the eagle(s) while on transect. Again, the two data recorders need to communicate with each other to ensure all necessary data are recorded in the field data form and GPS unit. After the obtaining the GPS location of sighted perched eagle(s), the pilot will then navigate to the location on the transect line where he/she came off line and continue on the survey. Rotation of the 3<sup>rd</sup> observer among crews will consist of approximately 3-4 flight days per crew. Each day, the observers will sit in a different seat of the aircraft (front-right, back-right, back-left). Rotation of seats among the 3 observers will allow estimation of observer effects in the analysis and more flexibility in the methodology used to estimate detection functions for golden eagles.

It is essential that the back right observer does not watch the front right observer and become “clued in” when an eagle is sighted due to movements of the front right observer.

Golden eagles observed by the back-right observer on flights when the front-right observer is not present will be announced in the same manner as eagles sighted by the back-left observer. The field data form needs to indicate whether 2 or 3 observers are present on that flight.

**Pilot Responsibilities.** The pilot is responsible for safely flying survey transects and maintaining the desired survey altitude and airspeed. The observers are responsible for sighting golden eagles and recording all sightings from all participants on the field data forms and in the GPS units. To avoid confusion and maintain the safety of the crew, the pilot will not call out golden eagle sightings independently except those that are missed by the primary observers. If the pilot sights a golden eagle or group of eagles, he or she should wait an appropriate length of time to allow the eagle(s) to pass out of view of the other observers (front and back seat). If the other observers in the aircraft do not announce that a sighting has been made, the pilot can then alert the observers that he/she saw a golden eagle or group of eagles. This information, along with the habitat type and activity of the observed eagle(s) will be recorded in the “comments” section of the field data form. Nothing will be entered into the GPS unit when the pilot sights eagles not

observed by the primary observers, and the pilot will not pull off-transect to circle the observed locations.

**Golden Eagles Observed Flying.** Communication between observers will be the same for sighted eagles flying and perched. If a golden eagle is observed flying, the pilot can pull off-line for the surveyors to try to identify and age the bird. However, ultimately, the latitude and longitude of the flying eagle perpendicular to the transect line will need to be recorded on the GPS unit and field data form. It is important to identify the bird first, then try to GPS the perpendicular point on the transect from where first seen. It may warrant noting a landmark and entering the GPS point when back on the transect after the bird has been identified and aged. Visual estimation of the distance of the eagle from the transect line also will be recorded. This estimate should be the distance of the bird perpendicular to the transect, even if above or below the plane.

**Recording Other Pertinent Data.** Location of the aircraft, time, and date are obtained and recorded automatically by the GPS unit at fixed intervals (every 10 seconds). This permits plotting of the actual flight path versus the theoretic lines and calculation of airspeeds. A radar altimeter will be used to help the pilot keep the aircraft at the intended height above the ground.

The observer responsible for the GPS unit will record locations and changes of habitat below the transect line. This will provide a habitat profile for each transect line and allow estimation of the total amount of each habitat type in the study area. In addition to habitat type, the survey method (safe vs rugged) will also be recorded, according to directions outlined in the *Habitat Descriptions* handout.

**Transect, Observer, and Weather Documentation.** At the beginning and end of each survey flight when the aircraft is on the ground or in transit to the survey area, the field data form recorder is responsible for entering documentation. Documentation includes, but is not limited to, the crew names and their positions within the aircraft, weather conditions, transect number to be flown, and the direction the flight line is flown (east-to-west or west-to-east). Weather information should include cloud cover percentage (0 to 100% CC), temperature at the beginning of the survey, and wind speed. Military times should be entered.

**Data Entry and Back-Up.** At the end of each survey day, the crew will be responsible for entering data from the field data forms into the ACCESS database designed specifically for this study and provided to each crew. This will ensure that any discrepancies/errors in the field data forms are corrected while the survey(s) under question are fresh in the minds of the crew. It will also serve as a backup in case field data forms are lost or damaged during the study. Data from the GPS units should also be downloaded every day to the crew's laptop computer. This will serve as backup storage in case the GPS units fail.

## Transects Over Restricted Airspace

Every effort has been made to identify restricted airspace prior to sending crews out into the field. However, at the end of each survey day, the crew needs to plan which transects will be flown the following day. This should be done with the help of the pilot, who can determine which airport(s) will be used for fueling, and refer to his/her flight maps and determine if the designated transects cross restricted or dangerous airspace. If transects are recognized as running through restricted airspace and access cannot be obtained, or the pilot does not believe the transect can be flown at the altitude and/airspeed defined in the protocol (above), then the transect should be moved out of the restricted/dangerous airspace. Moving of transect lines north, south, east or west should be done at random, if possible, only the necessary distance to ensure access and safety. If there is a choice between moving a transect east or west, or north or south, a coin flip will determine which direction the transect is moved. Care should be taken to ensure search areas from different transects do not overlap. If movement of a transect line is necessary, please inform the other field crews of the re-drawn transect.